



BOTSWANA EXAMINATIONS COUNCIL
Botswana General Certificate of Secondary Education

PHYSICS

0571/01

Paper 1 Multiple Choice

October/November 2017

1 hour

Additional Materials: Electronic calculator
Soft clean eraser
Soft pencil (type B or HB)
Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.

Read the instructions on the separate Answer Sheet very carefully.

Write your name, Centre number and candidate number in the spaces provided on the Answer Sheet unless this has already been done for you.

Sign your name in the space provided on the Answer Sheet.

There are **forty** questions on this paper. Answer **all** questions. For each question, there are four possible answers **A, B, C** and **D**. Choose the **one** you consider correct and record your choice using a **soft pencil** on the separate Answer Sheet.

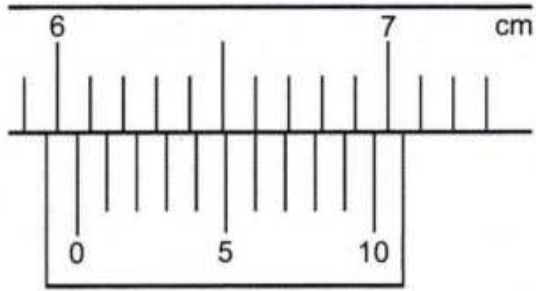
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

Do not use staples, paper clips, highlighters, glue or correction fluid.

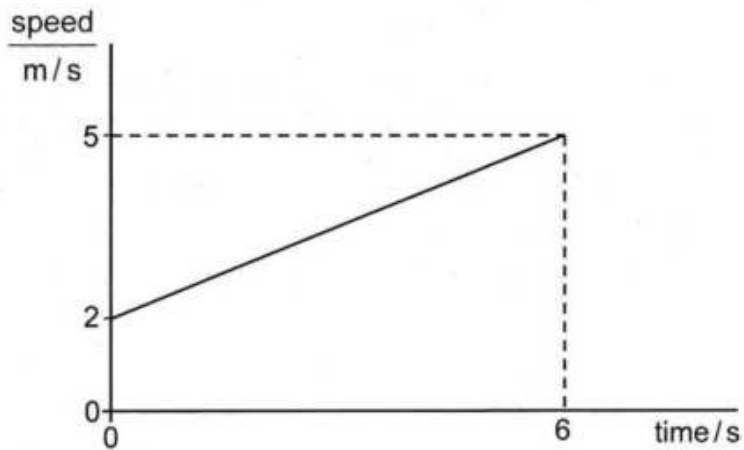
This document consists of **17** printed pages and **3** blank pages.

- 1 The diagram shows part of a Vernier caliper scale.



What is the reading shown?

- A 6.06 cm
 B 6.07 cm
 C 6.60 cm
 D 6.70 cm
- 2 The diagram shows a speed-time graph for a car.



What is the acceleration of the car?

- A 0.5m/s^2
 B 0.8m/s^2
 C 1.2m/s^2
 D 2.0m/s^2

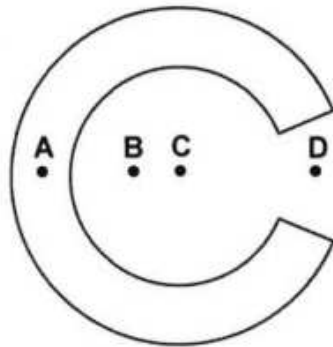
- 3 Metal X has a mass of 390 g and a density of 7.8 g/cm^3 .
 Metal Y has a volume of 20 cm^3 and a density of 2.7 g/cm^3 .
 Metal Z has a mass of 135 g and a volume of 50 cm^3 .

Which statement is true about metal Z?

	metal Z	justification
A	is the same as metal X	they have the same density
B	is the same as metal X	they have the same volume
C	is the same as metal Y	they have the same density
D	is the same as metal Y	they have the same mass

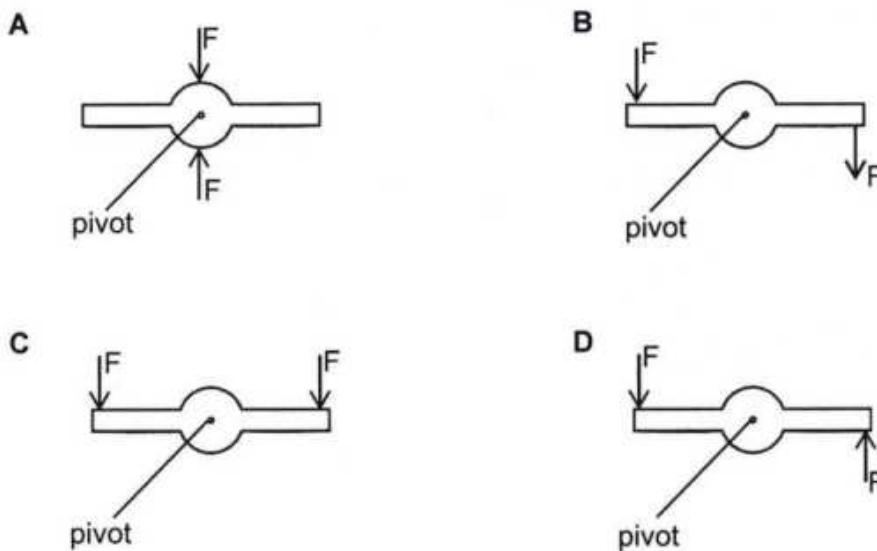
- 4 The diagram shows a C-shaped object.

Which position is most likely to be the centre of mass of the object?



- 5 The diagrams show forces acting on an object.

Which pair of forces shows a couple?



- 6 Which expression can be used to calculate power, where F = force, s = displacement and t = time?

A $\frac{Fs}{t}$

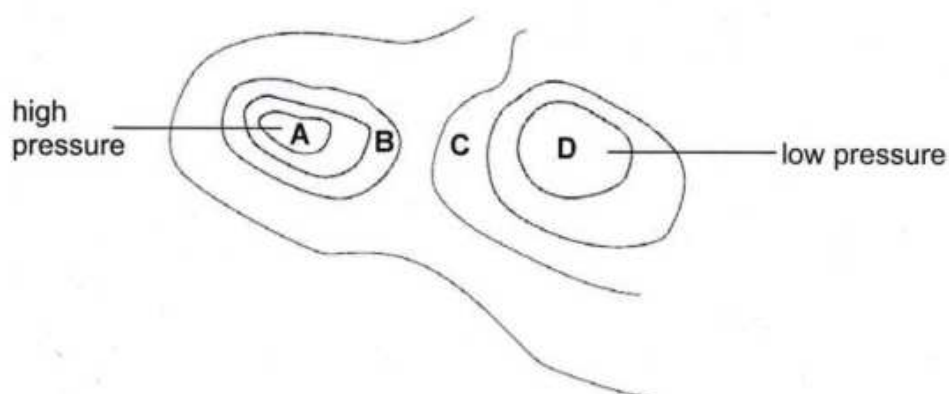
B $\frac{Ft}{s}$

C $\frac{st}{F}$

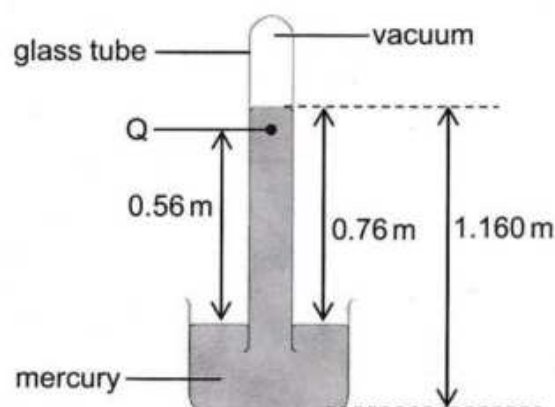
D $\frac{t}{Fs}$

- 7 The diagram shows a weather map.

In which of the four labelled regions is there likely to be the strongest winds?



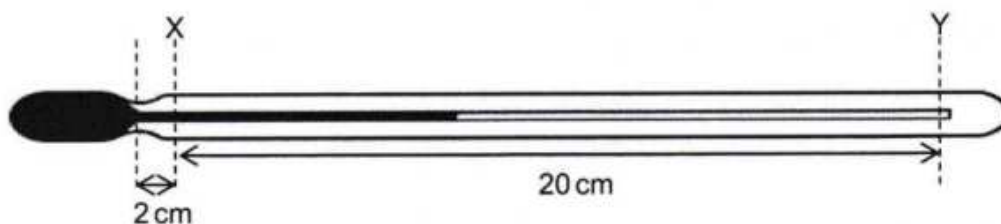
- 8 A glass tube containing mercury is inverted in a bowl of mercury as shown in the diagram. The diagram is not drawn to scale.



What is the pressure exerted by the mercury at point Q? ($g = 10 \text{ m/s}^2$, $\rho = 13\,600 \text{ kg/m}^3$).

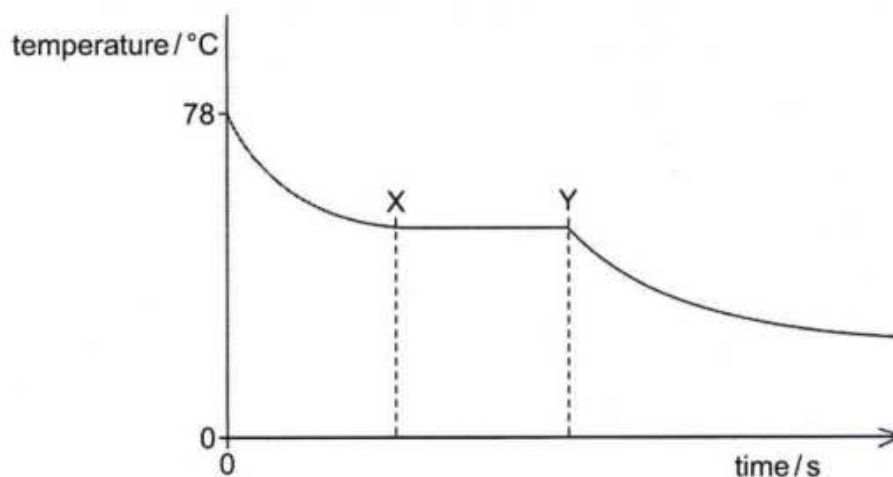
- A 27 200 Pa
 B 76 160 Pa
 C 81 600 Pa
 D 103 360 Pa

- 9 The diagram shows an uncalibrated liquid-in-glass thermometer, with fixed points X (0°C) and Y (100°C) marked on it.



What is the length of the liquid column when the temperature is 80°C ?

- A 16.0 cm
 B 16.4 cm
 C 17.6 cm
 D 18.0 cm
- 10 The heat capacity of an object is defined as the heat needed to
- A heat up the object to a temperature of 1°C .
 B heat up 1 kg of the object.
 C raise the temperature of the object by 1°C .
 D raise the temperature of 1 kg of the object by 1°C .
- 11 The diagram shows a cooling curve of a substance. The boiling point of the substance is 78°C .



What is the state of the substance for the period XY?

- A gas
 B gas and liquid
 C liquid
 D liquid and solid



12 What causes air to move from sea to land during a hot day?

- A Air always moves from the sea to the land.
- B Cool air from the land pushes warm air from the sea to the land.
- C The air above the land is warmer than the air above the sea.
- D The sea stores a lot more thermal energy than the land.

13 A beaker contains hot water.

How is thermal energy mainly lost from the surface of the water?

- A by conduction
- B by convection
- C by evaporation
- D by radiation

14 Smoke is introduced into a smoke cell and viewed through a microscope.

What is observed in the smoke cell?

- A air particles moving randomly
- B air particles colliding with smoke particles
- C smoke particles moving randomly
- D smoke particles pushed to the top of the cell

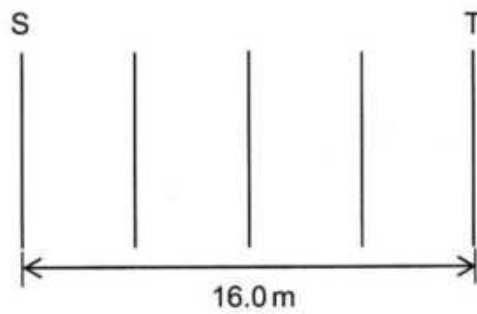
15 A small container is filled with substance P. The substance is transferred to a larger container. The substance fills the larger container also.

Which is a characteristic of substance P?

- A It can be compressed.
- B It has a definite shape.
- C It has a definite volume.
- D Its molecules are closely packed.



- 16 The diagram shows wavefronts of a sound wave.
The wavefront takes 0.20 seconds to move from S to T.



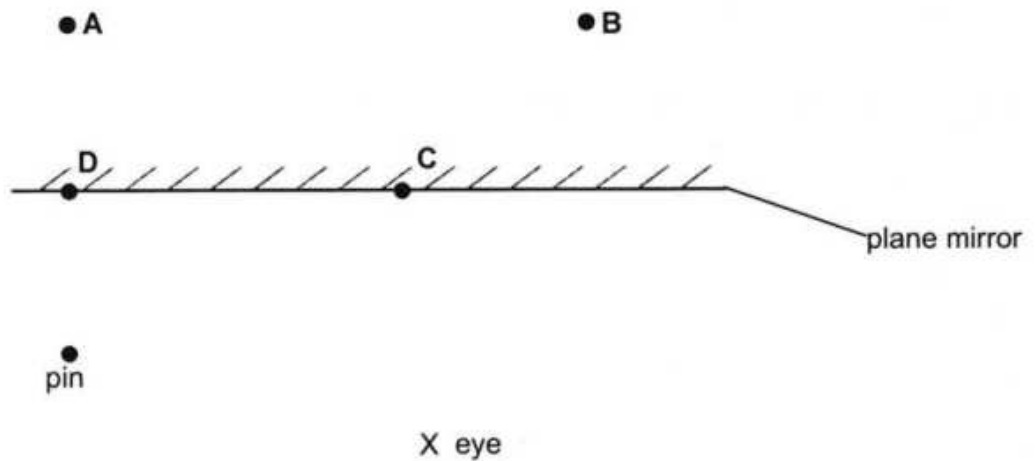
What is the frequency of the sound wave?

- A 16 Hz
B 20 Hz
C 25 Hz
D 80 Hz
- 17 A ray of light is incident on a water surface at an angle of 45° .
The refractive index of water is 1.33.

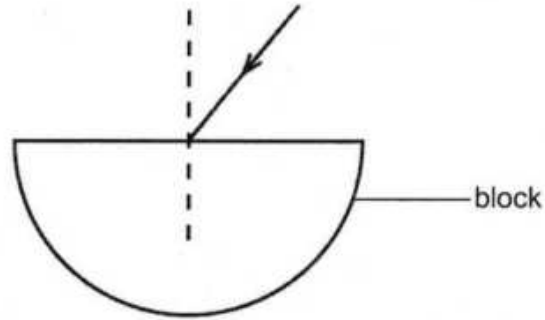
What is the angle of refraction of the ray?

- A 32.1°
B 33.8°
C 59.9°
D 70.1°
- 18 The diagram shows the position of a pin placed in front of a plane mirror.

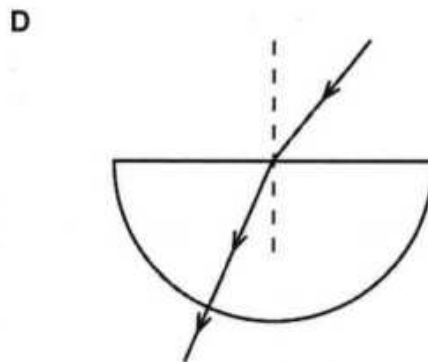
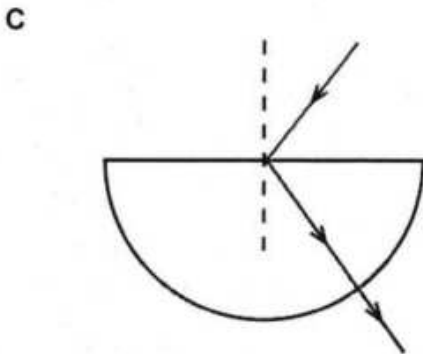
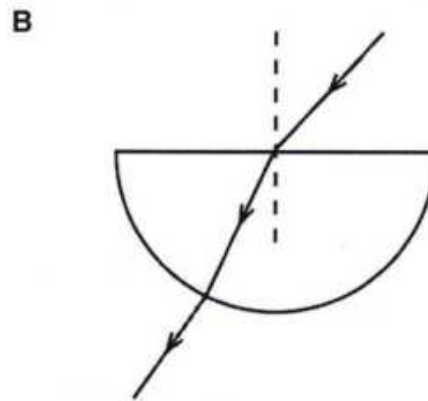
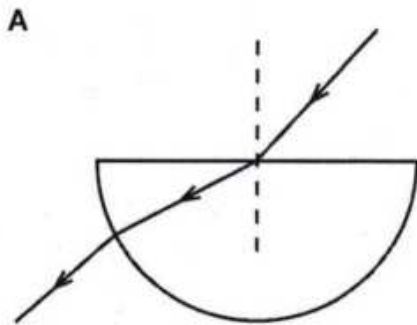
What is the position of the image of the pin, when viewed from the eye at X?



- 19 The diagram shows a ray of light incident on the centre of the plane side of a semi-circular glass block.



Which diagram shows the correct path of the ray through the block?

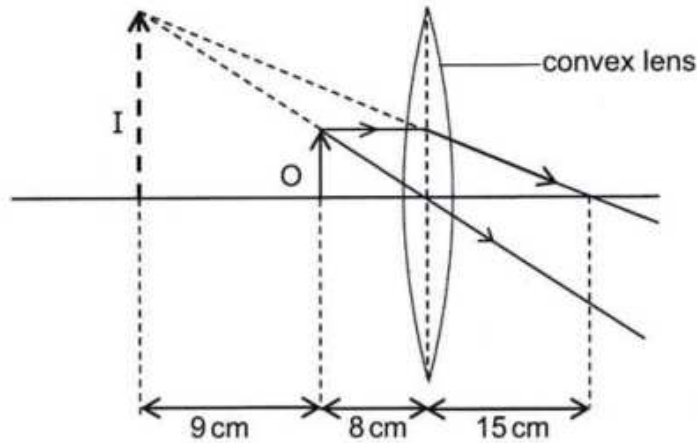


- 20 Which of the materials is **not** magnetic?

- A cobalt
- B iron
- C nickel
- D zinc

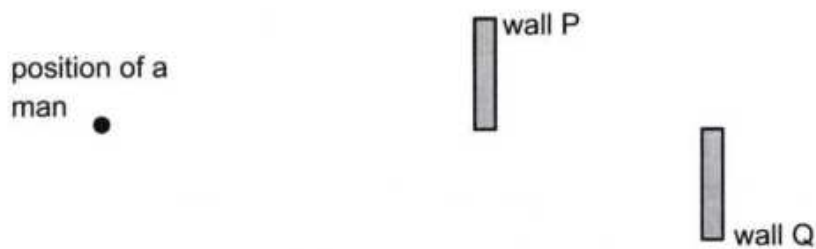


- 21 The diagram shows an image I, of an object O, formed by a convex lens.



What is the focal length of the lens?

- A 8 cm
 B 9 cm
 C 15 cm
 D 17 cm
- 22 The diagram shows the position of a man standing in front of two walls, P and Q, as viewed from above. He claps his hands once and hears two echoes, one after 1.0 s and the other 0.4 s later. The speed of sound in air is 320 m/s.

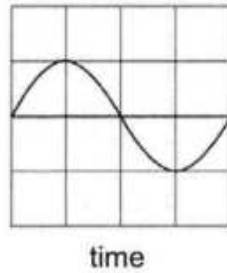


What is the distance between the two walls?

- A 64 m
 B 96 m
 C 128 m
 D 160 m

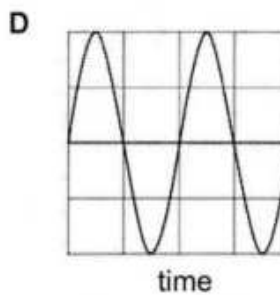
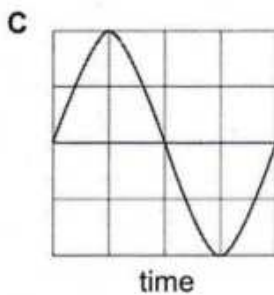
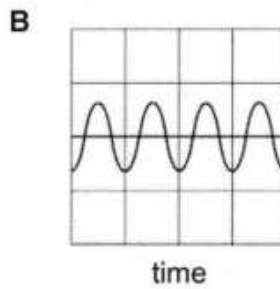
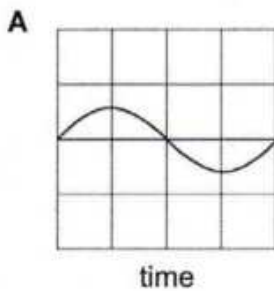


23 The diagram shows the waveform of a sound wave.



The pitch and the loudness of the sound are increased.

Which diagram shows the display of the new waveform?



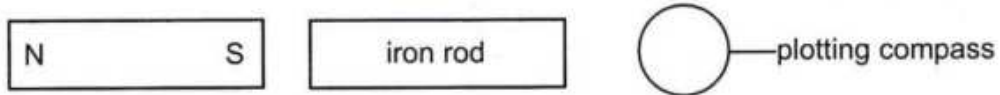
24 Radio waves and gamma rays are regions of the electromagnetic spectrum.

Which statement is true about radio waves and gamma rays?

- A Gamma rays are transverse and radio waves are longitudinal.
- B Gamma rays have lower frequency than radio waves.
- C Radio waves have longer wavelength than gamma rays.
- D Radio waves travel faster in a vacuum than gamma rays.



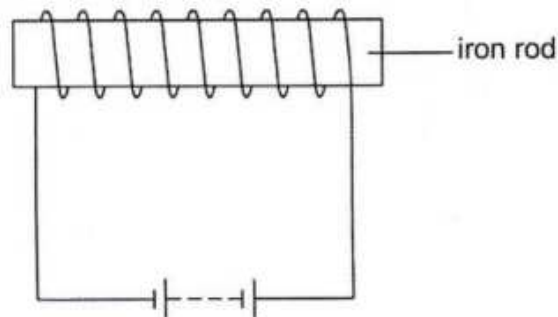
- 25 The diagram shows an iron rod placed between a permanent magnet and a plotting compass.



Which diagram shows the direction of the needle of the plotting compass?

- A  B 
- C  D 

- 26 The diagram shows an electromagnet.

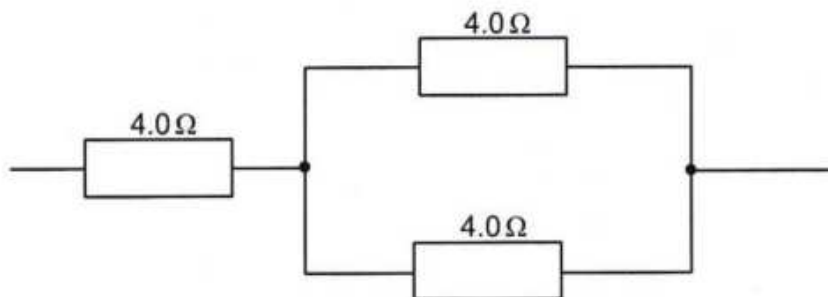


What change can increase the strength of the electromagnet?

- A increasing the number of cells
 B moving the turns of the coil further apart
 C replacing iron with steel
 D using alternating current
- 27 What is the unit of electric charge?
- A ampere
 B coulomb
 C ohm
 D watt



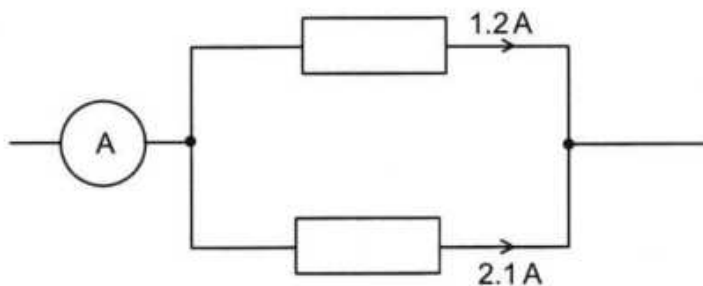
28 The diagram shows a combination of resistors.



What is the total resistance of this combination of resistors?

- A $0.75\ \Omega$
- B $5.3\ \Omega$
- C $6.0\ \Omega$
- D $12.0\ \Omega$

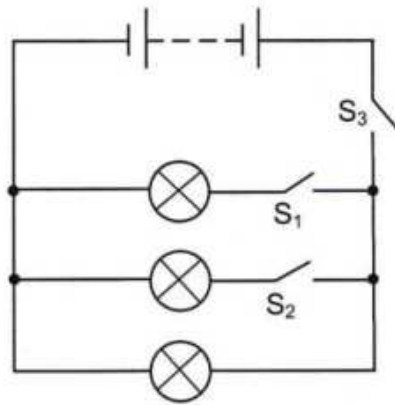
29 The diagram shows resistors connected in parallel. An ammeter is connected in series with them.



What is the reading shown by the ammeter?

- A $0.9\ \text{A}$
- B $1.2\ \text{A}$
- C $2.1\ \text{A}$
- D $3.3\ \text{A}$

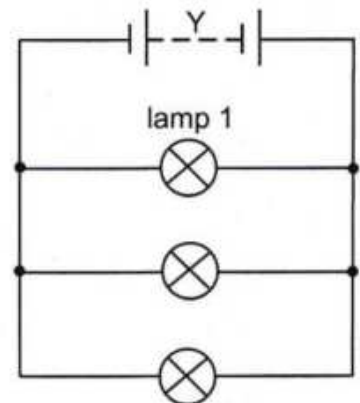
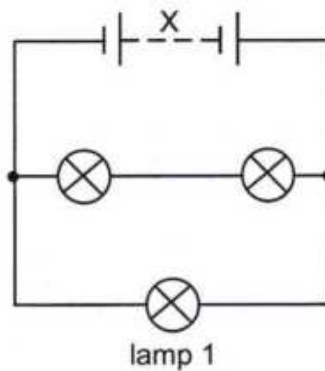
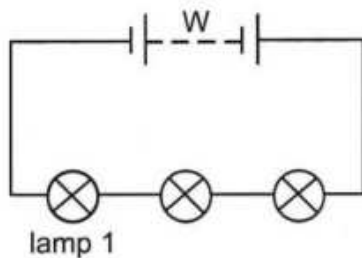
30 The diagram shows an electric circuit.



Which of the switches must be closed to light one bulb only?

- A S_1
- B S_3
- C S_1 and S_3
- D S_2 and S_3

31 The diagrams show identical lamps and batteries in different circuits W, X and Y.

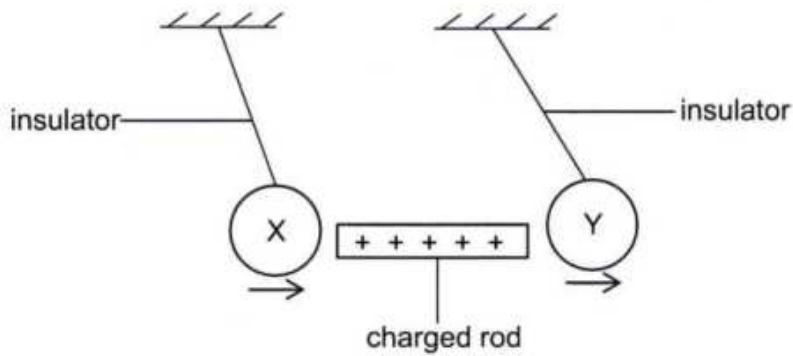


In which of the circuits will the brightness of lamp 1 be the same?

- A W and X only
- B X and Y only
- C W and Y only
- D W, X and Y



- 32 The diagram shows a positively charged rod placed between small metal spheres, X and Y. Each sphere is suspended with an insulator.

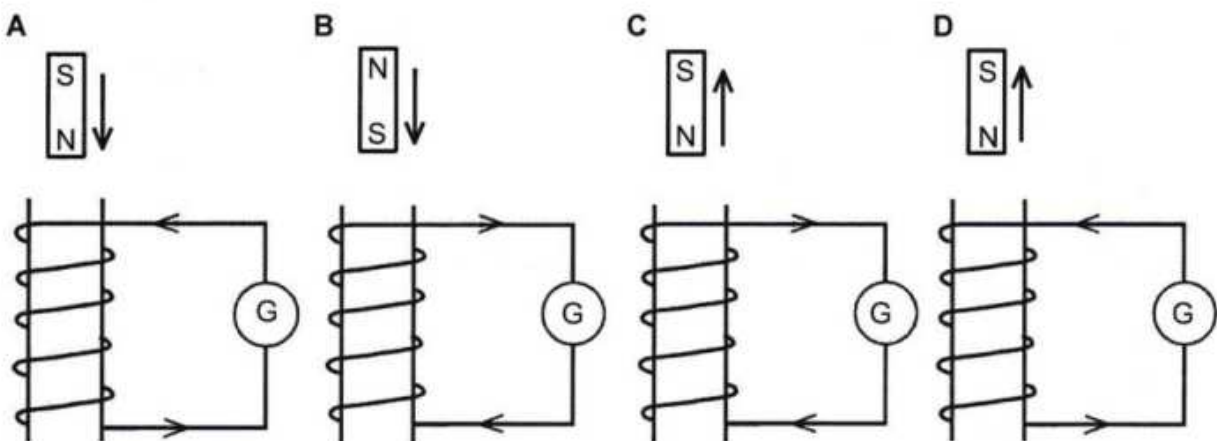


Sphere X moves towards the rod, and sphere Y moves away from the rod.

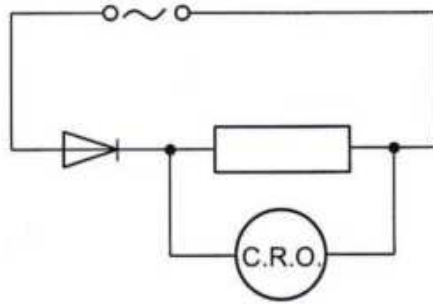
What are the likely charges of the spheres?

	X	Y
A	neutral	negative
B	neutral	positive
C	negative	neutral
D	positive	neutral

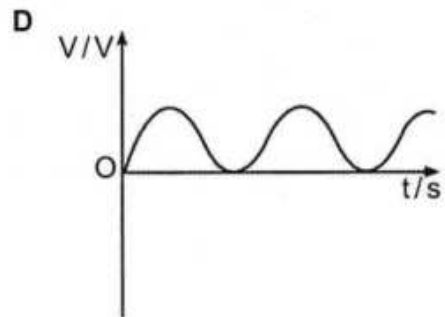
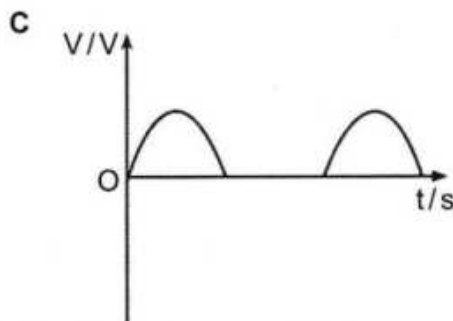
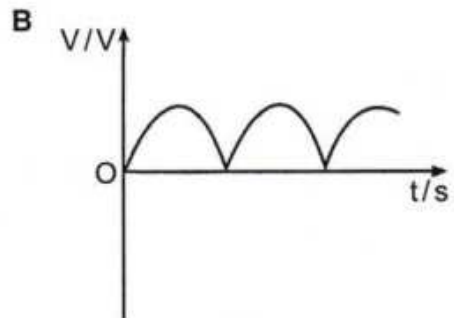
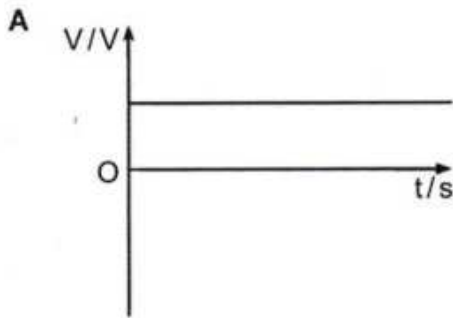
- 33 Which diagram shows the movement of the magnet and the direction of the induced current in the coil?



- 34 The diagram shows an electric circuit connected to a cathode-ray oscilloscope (C.R.O.).



Which diagram shows the possible display on the C.R.O.?



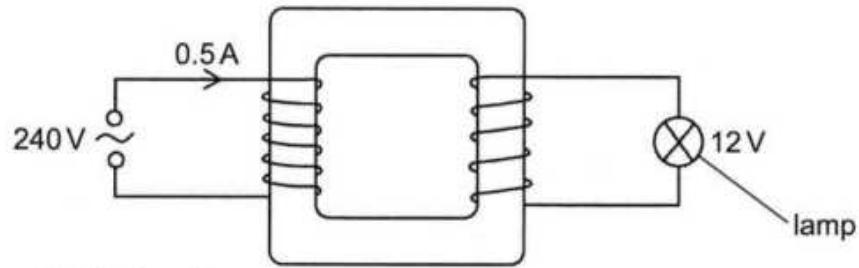
- 35 A heater is connected to the mains and switched on for 30 minutes. The reading of the pre-paid electricity meter changes from 5.00 kWh to 3.00 kWh. Electricity is charged at P0.70 per kWh.

What is the cost of using the heater?

- A** P0.70
B P1.05
C P1.40
D P1.75



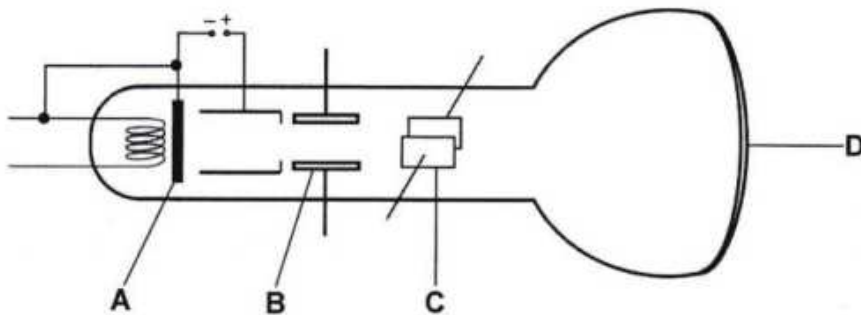
- 36 The diagram shows a step-down transformer which is 80 % efficient, used to light a lamp.



What is the current in the lamp?

- A 0.4 A
 - B 8 A
 - C 10 A
 - D 12.5 A
- 37 The diagram shows a simple cathode-ray oscilloscope, as seen from the side.

Which part deflects the electron beam horizontally?



- 38 Which row shows radiation with the lowest penetrating power and radiation with the highest ionisation effect?

	lowest penetrating power	highest ionisation effect
A	alpha	alpha
B	alpha	gamma
C	gamma	alpha
D	gamma	gamma



- 39 The diagram shows a Geiger-Muller (GM) tube placed near a radioactive source which emits alpha and beta particles.



The table below shows the count rate when different materials are placed at position X.

material at X	count rate counts/s
nothing	50
one sheet of paper	30
8 mm of aluminium	20

What is the count rate due to the background radiation?

- A 20 counts/s
 B 30 counts/s
 C 50 counts/s
 D 70 counts/s
- 40 A radioactive nucleus A_ZX decays by emitting a beta particle to form nucleus Y.

What is the atomic number and the mass number of Y?

	atomic number	mass number
A	$Z - 2$	$A - 4$
B	$Z + 1$	A
C	$A - 4$	$Z - 2$
D	A	$Z + 1$

